A MULTI-OBJECTIVE OPTIMISATION ALGORITHM FOR LOCATING HUMANITARIAN FACILITIES

KIT SEARLE

Kit Searle completed his PhD as part of the Stellenbosch Unit for Operations Research in Engineering at Stellenbosch University in 2021. He since joined the University of Edinburgh as a University Teacher in Operational Research and is the programme director for the MSc programmes in Operational Research offered at the School of Mathematics. His research interests are in combinational optimisation, more specifically pertaining to exact and heuristic solution approaches towards solving practical problems in facility location, vehicle routing and scheduling. Recently, he has been involved in projects related to designing electric vehicle charging infrastructure when the demand is uncertain, a multi-objective optimisation problem in construction scheduling, maintenance scheduling for off-shore wind farms, and hydrogen refuelling infrastructure network design.

The type of data returned by the MSF accessibility model provides an opportunity to incorporate cutting-edge geospatial analysis methods within rich and large-scale facility location problems to assist decision makers at MSF in determining where to locate medical facilities. In this context, a medical facility is deemed accessible to an individual if they do not need to commute for longer than k hours to access the site. Therefore, a decision maker must determine where to locate between m and n medical facilities in such a way that simultaneously maximises the reduction in travel hours for both individual households and villages which fall within the 2-hour travel limit.
In this presentation I will present a multi-objective, multi-resolution genetic algorithm with several enhancements such as local search operators and variable length chromosomes. I will then present some results from a case study carried out in South Madagascar.